Phosphoserine phosphatase is expressed in the neural stem cell niche and regulates neural stem and progenitor cell proliferation.

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Public Summary:
Phosphoserine phosphatase (PSP) metabolizes the conversion of l-phosphoserine to l-serine, classically known as an amino acid necessary for protein and nucleotide synthesis and more recently suggested to be involved in cell-to-cell signaling. Previously, we identified PSP as being enriched in proliferating neural progenitors and highly expressed by embryonic and hematopoietic stem cells, suggesting a general role in stem cells. Here we demonstrate that PSP is highly expressed in periventricular neural progenitors in the embryonic brain. In the adult brain, PSP expression was observed in slowly dividing or quiescent glial fibrillary acidic protein (GFAP)-positive cells and CD24-positive ependymal cells in the forebrain germinal zone adjacent to the lateral ventricle and within GFAP-positive cells of the hippocampal subgranular zone, consistent with expression in adult neural stem cells. In vitro, PSP overexpression promoted proliferation, whereas small interfering RNA-induced knockdown inhibited proliferation of neural stem cells derived from embryonic cortex and adult striatal subventricular zone. The effects of PSP knockdown were partially rescued by exogenous l-serine. These data support a role for PSP in neural stem cell proliferation and suggest that in the adult periventricular germinal zones, PSP may regulate signaling between neural stem cells and other cells within the stem cell niche. Disclosure of potential conflicts of interest is found at the end of this article.

Scientific Abstract:
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